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SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS DURING JULY, 1926

By HERBERT H. KIMBALL, Solar Radiation Investigations

For a description of instruments and exposures and an account of the method of obtaining and reducing the measurements, the reader is referred to the REVIEW for January, 1924, 52:42, January, 1925, 53:29, and July, 1925, 53:318.

From Table 1, it is seen that solar radiation intensities averaged slightly below the normal for July at all three stations.

Table 2 shows a deficiency in the amount of radiation received on a horizontal surface from the sun and sky, which was pronounced at Washington.

Skylight polarization measurements made on 5 days at Washington give a mean of 53 per cent, with a maximum of 56 per cent on the 12th. Measurements made on 6 days at Madison give a mean of 49 per cent, with a maximum of 65 per cent on the 14th. These are close to the corresponding averages for July at Washington and below at Madison.

TABLE 1.—*Solar radiation intensities during July, 1926*

[Gram-calories per minute per square centimeter of normal surface]

WASHINGTON, D. C.

| Date | Sun's zenith distance | | | | | | | | | | |
|------------|-----------------------|----------|-------|-------|-------|------------------|-------|-------|-------------|-------|--|
| | 8 a.m. | 78.7° | 75.7° | 70.7° | 60.0° | 0.0° | 60.0° | 70.7° | 75.7° | 78.7° | |
| | 75th mer. time | Air mass | | | | | | | | | |
| | e. | 5.0 | 4.0 | 3.0 | 2.0 | 1.0 ¹ | 2.0 | 3.0 | 4.0 | 5.0 | |
| July 1 | mm. | cal. | cal. | cal. | cal. | cal. | cal. | cal. | cal. | mm. | |
| 7 | 9.83 | ----- | ----- | 0.78 | 1.06 | 1.04 | ----- | ----- | ----- | 14.60 | |
| 8 | 16.79 | ----- | ----- | 0.60 | 1.38 | 0.99 | 0.62 | ----- | ----- | 12.68 | |
| 10 | 11.38 | ----- | 0.63 | 0.90 | ----- | ----- | ----- | 1.22 | ----- | 6.76 | |
| 12 | 19.23 | ----- | 0.98 | ----- | ----- | ----- | ----- | ----- | ----- | 9.83 | |
| 16 | 9.83 | 0.84 | 0.97 | 1.11 | 1.40 | 1.05 | 0.67 | ----- | ----- | 16.20 | |
| 17 | 11.81 | 0.60 | 0.74 | 0.92 | ----- | ----- | ----- | 1.19 | 0.84 | 16.20 | |
| 19 | 13.13 | 0.45 | 0.60 | 0.74 | 1.02 | ----- | ----- | 0.76 | ----- | 11.38 | |
| 21 | 13.61 | ----- | 0.92 | 1.00 | ----- | ----- | ----- | 1.01 | 1.29 | 7.29 | |
| 22 | 19.89 | 0.63 | 0.74 | 1.21 | 0.77 | 0.61 | ----- | 0.86 | 1.18 | 13.61 | |
| Means | 0.63 | 0.75 | 0.87 | 1.21 | 0.94 | 0.63 | ----- | 0.98 | 1.24 (0.84) | ----- | |
| Departures | -0.02 | -0.01 | -0.02 | +0.03 | -0.04 | -0.14 | ----- | -0.07 | -0.03 -0.16 | ----- | |

TABLE 1.—*Solar radiation intensities during July, 1926—Continued*
MADISON, WIS.

| Date | Sun's zenith distance | | | | | | | | | | |
|----------------|-----------------------|----------|-------|-------|-------|------------------|-------------|-------|-------|-------|--|
| | 8 a.m. | 78.7° | 75.7° | 70.7° | 60.0° | 0.0° | 60.0° | 70.7° | 75.7° | 78.7° | |
| | 75th mer. time | Air mass | | | | | | | | | |
| | e. | 5.0 | 4.0 | 3.0 | 2.0 | 1.0 ¹ | 2.0 | 3.0 | 4.0 | 5.0 | |
| July 6 | mm. | cal. | cal. | cal. | cal. | cal. | cal. | cal. | cal. | mm. | |
| 7 | 7.29 | ----- | ----- | ----- | ----- | 1.04 | ----- | ----- | ----- | 14.60 | |
| 13 | 14.60 | ----- | ----- | ----- | ----- | 0.99 | 1.26 | ----- | ----- | 12.68 | |
| 14 | 8.81 | ----- | ----- | ----- | ----- | ----- | 1.22 | ----- | ----- | 6.76 | |
| 20 | 8.48 | ----- | ----- | ----- | ----- | ----- | 1.42 | ----- | ----- | 9.83 | |
| 21 | 13.13 | ----- | ----- | ----- | ----- | ----- | 1.19 | 0.84 | ----- | 16.20 | |
| 23 | 14.60 | ----- | ----- | ----- | ----- | 0.76 | 1.09 | ----- | ----- | 16.20 | |
| 26 | 10.97 | ----- | ----- | ----- | ----- | 1.01 | 1.29 | ----- | ----- | 11.38 | |
| Means | 10.59 | ----- | ----- | ----- | ----- | 0.86 | 1.18 | ----- | ----- | 7.29 | |
| Departures | ----- | ----- | ----- | ----- | ----- | 0.98 | 1.24 (0.84) | ----- | ----- | ----- | |
| ----- | ----- | ----- | ----- | ----- | ----- | 0.07 | -0.03 -0.16 | ----- | ----- | ----- | |
| LINCOLN, NEBR. | | | | | | | | | | | |
| July 11 | 9.83 | ----- | 0.82 | 0.95 | 1.27 | 1.55 | 1.08 | 0.85 | 0.75 | 10.59 | |
| 13 | 7.87 | ----- | ----- | ----- | 1.17 | 1.40 | 1.06 | 0.97 | 0.84 | 7.04 | |
| 18 | 13.13 | ----- | ----- | ----- | 1.04 | ----- | ----- | ----- | ----- | 13.61 | |
| 19 | 15.11 | 0.78 | ----- | 0.91 | 1.09 | 1.30 | ----- | ----- | 0.63 | 14.60 | |
| 20 | 14.10 | ----- | ----- | 0.94 | 1.12 | 1.31 | 0.98 | 0.77 | 0.61 | 11.38 | |
| 22 | 12.24 | ----- | 0.85 | 1.05 | 1.30 | 0.99 | 0.76 | 0.62 | 0.50 | 7.29 | |
| 23 | 10.59 | ----- | 0.74 | 0.87 | ----- | ----- | ----- | ----- | ----- | 13.61 | |
| Means | (0.80) | 0.88 | 1.09 | 1.37 | 1.02 | 0.84 | 0.69 | ----- | ----- | ----- | |
| Departures | ±0.00 | -0.01 | +0.01 | +0.04 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 | ----- | |

¹ Extrapolated.

TABLE 2.—*Solar and sky radiation received on a horizontal surface*
[Gram-calories per square centimeter of horizontal surface]

| Week beginning | Average daily radiation | | | | | Average daily departure from normal | | |
|---------------------------------------|-------------------------|---------|---------|---------|----------|-------------------------------------|---------|---------|
| | Washington | Madison | Lincoln | Chicago | New York | Washington | Madison | Lincoln |
| | cal. | cal. | cal. | cal. | cal. | cal. | cal. | cal. |
| July 2 | 384 | 509 | 475 | 414 | 368 | .97 | .28 | -102 |
| 9 | 538 | 585 | 614 | 405 | 357 | +57 | +55 | +31 |
| 16 | 439 | 530 | 630 | 420 | 440 | -36 | +18 | +59 |
| 23 | 419 | 426 | 503 | 413 | 380 | -45 | -64 | -42 |
| Excess since first of year on July 29 | ----- | ----- | ----- | ----- | ----- | +847 | +3,388 | +378 |